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CENTRAL INTELLIGENCE AGENCY

Office of Legislative Liaison
Washington, D. C. 20505

Telephone: **STAT**

TO: Mr. Scott Ulm, Majority Staff
Committee on Governmental Affairs
United States Senate

Scott:

The attached memo was prepared in response to a question you raised at the briefing on 2 December 1983. Please note the Confidential classification.

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14 December 1983

MEMORANDUM FOR THE RECORD

SUBJECT: The Use of Low Enriched Uranium (LEU) in Heavy Water Moderated Reactors

1. The majority of heavy water reactors including the Candu type are fueled with natural uranium oxide. However, several heavy water reactors use low enriched uranium (LEU) as fuel instead of natural (unenriched) uranium. Studies were conducted by Canada in the late 1950's regarding the use of either uranium metal or uranium oxide fuel with uranium enrichment levels ranging from natural uranium to 1.16 percent uranium-235. The studies showed that lower costs could result for systems using enriched uranium, depending on the relative costs of natural and enriched uranium. A much higher level of irradiation, however, must be achieved for any saving. In addition, using slightly enriched metal fuel resulted in lower costs than slightly enriched uranium oxide. However, the stability of enriched uranium oxide fuel under irradiation is greater than that of uranium metal. Therefore, a higher level of irradiation can be achieved leading to increased burn-up levels using highly enriched uranium oxide. But slightly enriched uranium fuel in heavy water reactors must remain in the reactor core for a longer period of time in order to economically optimize the use of uranium-235. The time is often beyond the physical capability of the fuel to withstand a nuclear reactor core environment such as high temperature and pressure. This limitation, however, may no longer exist because of advances in nuclear fuel development.

2. A number of heavy water research and power reactors throughout the world use LEU as fuel. Some of these include

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